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THE JOURNAL OF PHILOSOPHY

SCIENCE AS HISTORY

I

IT was widely believed during the last decades of the nineteenth and the first two decades of the twentieth century that the principal result of accepting the evolutionary doctrine was to involve scientific and philosophic thought in a hopelessly frustrating dilemma. The dilemma may be formulated thus: historical explanation, it was asserted, demands the discovery and disclosure of explanatory facts that are prior in time to the thing to be explained; this being the case, it follows that we shall be ever receding temporally in search of the explanation, and that although we shall, in our backward-moving path, come across many interesting, valuable, and possibly illuminating facts, the problem we set out to solve, and which alone justifies and directs our receding movement, is left precisely in the same state of irresolution at the furthermost recession in time as at the temporal beginning of our quest.

This dilemma is a serious one; but it has become ever more clearly seen in recent years that it is not inherent in the concept of evolution, that its source is to be located in the manifest failure of thinkers really to get rid of their pre-evolutionary complement of ideas. They condemn themselves either to revolving in a dizzy circle, or else to getting lost ever deeper in the dark backward and abysm of time, because they seek mechanically to conjoin their inherited set of fixed ideas with evolutionary concepts. When developmental ideas are superimposed upon static or non-developmental, or vice versa, then and only then does the dilemma in question result. Indeed, then and then only is it bound to result. Since it is always much easier to condemn the new than it is to disabuse one's mind of the old, the burden of impossible confusion and regressive intellectual sterility was, at the outset and with enviable assurance, placed on evolutionism.

In addition to the natural human tendency to cling to the old (no matter how badly worn), to be suspicious of the new (no matter how excellent it may be) and to accuse the new of being solely responsible for whatever difficulties and troubles arise because of conflict between new and old—in addition to this general tendency, there was one specific, supreme obstacle, one intellectual dead-hand

that obstructed the proper understanding and prevented the adequate explication of the evolutionary point of view: the intellectual dead-hand of physical and astronomical science in the nineteenth and early twentieth centuries.

It is an old story which needs no retelling that during this period Newton was God for all recognized scientists, and Newtonianism the fixed and eternal foundation, unshakably established, of all natural science. To question the authority of Newtonianism was equivalent to initiating a Luciferian rebellion, impious in inception and irrevocably doomed to defeat. Or if not Luciferian, then at best Shelleyan, like Goethe's attempt to dethrone Newton—the only respect, possibly, in which Goethe was, like Arnold's Shelley, "a beautiful and ineffectual angel, beating in the void his luminous wings in vain."

It is not quite so old a story, but it is none the less one in no need of retelling, that by the year 1921 or thereabouts, Einsteinian relativity achieved the theretofore unbelievable task of successfully displacing Newtonian absolutism from astronomy—from the very heavens wherein, it had been accepted, God Himself had written Newton's *Principles,* and wherein its supremacy had never been directly challenged before, be it by beautiful poetic angels or by equally ineffectual idealistic philosophers.

Newtonian absolutism had, however, as a matter of fact, been indirectly challenged long before Einstein, namely, by Darwin and the doctrine of evolution. The ungodly furor, wholly adventitious, caused by the particular issue of the descent of man, totally obscured the far greater scientific and philosophic issue evolution necessarily implies. The basic and most important general proposition implied by evolutionism is that time is a fundamental and irreducible characteristic of nature. Or, in other words, its basic proposition is that nature is in temporal process and therefore all science of nature is necessarily historical. Darwin and his followers, it is true, restricted their assertions to the geological and biological domains, but evolutionism implies the above general proposition and implies it infallibly. For the geological and biological domains are interacting parts of a larger domain: if they have a history, the total globe considered as a unit must have a history; and if the globe, then the solar system; and if the solar system, then the larger astronomical system of which it is a part; and so on as extensively as interacting relations can be specifically discovered to exist, or can be demonstrated to be implied by relationships discovered. That is to say, the fact that one part of nature has a history or is in temporal process involves that the rest of nature, at least in so far as there are within nature relations of continuity,

is also in temporal process, or has a history. Unless, of course, we believe in miracles. For to believe that any historical or temporally developing segment of nature can exist within a more inclusive nature that is non-historical, non-temporal, non-developing is effectively to believe in miracles whether we realize it or not. It may be pointed out in passing that the Newtonian universal laws of nature both presupposed and implied a comprehensive continuity in nature and one incomparably more tightly interlaced than the qualified evolutionary proposition just asserted.

That nature is in temporal process, that nature and all things in nature have a history, and therefore, that anything to be scientifically explained must be explained historically, constitute the essential phases of the fundamental proposition of evolutionism. The specific concepts of natural selection, survival of the fittest, and so on, are secondary. They are attempts to define some of the laws of history operative in certain of the domains of nature. Whether they are right or wrong, and in what measure right or wrong, are also secondary matters. The fact that historians of the human race have often, or even always, been wrong about the laws of human history has never in any way prejudiced the inclusive fact that the human race has a history. Likewise the fact that Darwin, his followers, and successors have often, or even always, been wrong about the laws of natural history does not prejudice the inclusive fact that nature has a history.

The basic proposition of evolutionism—which anyone today can see is basic—was precisely the proposition that was totally ignored by scientists until Einsteinian relativity upset the Newtonian applecart. Scientists before Einstein did not, of course, deny that the geological and biological domains were historical, nor did they deny that the scientific explanation therefore of any geologic or biologic form necessarily had to be an explanation that at least also included an account of the temporal processes, temporal interactions, temporal transformations determining the emergence of that form. But before Einstein, scientists and most philosophers did maintain that just because in these fields scientific explanation had to be also historical, therefore these fields (and all others necessitating the same type of scientific explanation) ranked very low indeed in the hierarchy of sciences and were of negligible importance for disclosing the cosmic characters of nature. The important sciences, those whose results were truly and basically revelatory of the ultimate structure of nature, dealt exclusively with the non-temporal, the eternal and immutable—with the forms and laws of nature that were unchanging and fixed and that were universal throughout the extent of nature.

A passage from one of Russell's essays, first published in July, 1914, admirably expresses the then dominant attitude of scientists and philosophers in this regard.

> The arguments for the contention that time is unreal and that the world of sense is illusory must, I think, be regarded as fallacious. Nevertheless there is some sense—easier to feel than to state—in which time is an unimportant and superficial characteristic of reality. Past and future must be acknowledged to be as real as the present, and a certain emancipation from slavery to time is essential to philosophical thought. The importance of time is rather practical than theoretical, rather in relation to our desires than in relation to truth. A truer image of the world, I think, is obtained by picturing things as entering into the stream of time from an eternal world outside, than from a view which regards time as the devouring tyrant of all that is. Both in thought and in feeling, even though time be real, to realize the unimportance of time is the gate of wisdom [*Mysticism and Logic*, pp. 21–22].

The measure of the Einsteinian revolution may be fairly estimated by the archeological quality Russell's passage has attained in the interim. Fourteen years after Russell's declaration, Eddington, as physicist and astronomer, not as philosopher, wrote: "I think we might go so far as to say that time is more typical of physical reality than matter."[1] And Whitehead, several years later: "The modern evolutionary view of the physical universe should conceive of the laws of Nature as evolving concurrently with the things constituting the environment. Thus the conception of the Universe as evolving subject to fixed, eternal laws regulating all behavior should be abandoned."[2] Russell, too, has come round to accepting that time is a real and fundamental ingredient in the nature of things, and that its importance for the understanding of Nature can not be overestimated.[3]

II

The backbone of the opposition to evolutionism as a cosmic doctrine, as the essential basis for scientific explanation in all fields without exception, was the Newtonian cosmology and the conception of the nature of history that cosmology, with its denigration of time, implied.

Against the Newtonian, we must set what may justly be called the Einsteinian concept of history. For more clearly and emphatically than the Darwinian doctrine, the first demand the Einsteinian cosmology lays upon all engaged in the pursuit of science, whether natural or social, is that they reconstruct the concept of history so

[1] *The Nature of the Physical World*, p. 275.
[2] *Adventures of Ideas*, p. 143.
[3] See, *Analysis of Matter*, p. 286 and passim.

that the nature of history becomes congruent with the nature of the universe.

The Newtonian cosmos, as everyone knows, consisted of a three-dimensional absolute space and a one-dimensional or linear absolute time. The most extraordinary feature of this cosmos was that the two absolutistic parts were absolutely independent of each other. To be thus independent they had of course to be in their inherent natures basally disparate. And Newton defined them so to be. "Absolute space, in its own nature, without regard to anything external, remains always similar and immovable." "Absolute, true and mathematical time, of itself, and from its own nature, flows equably without regard to anything external." To conceive of the cosmos as composed of two such qualitatively mutually exclusive parts requires an imaginative and intellectual power neither Newton nor any one else, we may safely say, ever did or ever could possess. For if, and only if, the integration of an eternal perfect circle and an eternal perfect square in an eternal unitary geometrical figure can be effected, then and only then can be effected the integration of Newtonian absolute space and Newtonian absolute time in any sort of cosmic unity.

It may, I think, be asserted categorically, without courting the charge of dogmatism, that no matter what relationships between circle and square may be established, square and circle will, as geometrical figures, always retain as irreducible their qualitative differences; that no matter what operations and manipulations circle and square are mathematically subjected to, they can never be welded into qualitative geometrical unity.

The case of circle and square faithfully illustrates the case of Newtonian space and time because the latter are also defined by absolute, eternal, and immutable qualitative characteristics which are mutually exclusive. Hence, with equal categorical assurance, it may be stated that no matter what relationships may be established between an immovable absolute space and an ever-equably-flowing absolute time, no matter what correlations between them may be instituted, their qualitative differences will forever remain irreducible; and therefore the most intimate union that can ever be established between such a space and such a time can never be more intimate than that of tangential juxtaposition or external quantitative correlation. They can never coalesce together so as to constitute the comprehensive qualitative characteristics of *one* cosmos.

The Newtonian system attained its overwhelming power over the modern intellectual world because of Newton's exemplary success in giving it mathematical formulation. The identification of Newtonian time with "mathematical time" was, however, nothing more

serious than an arrogant act of mathematical history. For there is nothing inherent in the nature of mathematics which makes the mathematical treatment of time eventuate necessarily in the Newtonian concept. And only if there were some inevitable or inevadable connection between the two would there be any justification and warrant for Newton's dogmatism that "true and *mathematical* time" is as he defined it. Mathematics, as we now know by actual demonstration, is capable of formulating equations which embody a conception of time as radically different from the Newtonian as is the Einsteinian. Indeed, mathematics is actually or potentially capable of expansion in ways that will make it competent to handle and formulate in equations any conceivable concept of time (or any conceivable concept of anything else, for that matter [4]). If this is not the case, and mathematics has inherent in it a delimited range of form, or is inherently restricted in the direction of its possible development, then it is sheer nonsense to maintain, as is done today, that mathematics is conversant with the realm of possibility. If this is not the case, then those advanced mathematicians and philosophers of mathematics who assert that mathematics is concerned with the omnipossible are indulging in nothing more instructive than high-sounding verbiage.

The identification of "mathematical time" with either the Newtonian or the Einsteinian or any other specific concept of time, although still done, is a fundamental and palpable error. As between two or more opposing concepts, mathematics is strictly neutral—the only thing in the whole wide world, perhaps, that can on any subject maintain a strict neutrality consonantly with its own nature, without detriment to itself and with benefit to others. Because of the essential neutrality of mathematics, only confusion results when specific mathematical formulations are introduced as arguments on behalf of special cosmological doctrines. Mathematical formulations can be made to support *any* cosmology. Hence mathematics must be put to one side as incompetent to determine, and as irrelevant for the settling of, cosmological issues.

III

The general effect of the Newtonian cosmology was, as Russell succinctly stated, to make time a superficial characteristic of reality. When time is superficial, history can be no more. A stream can rise no higher than its source—except by artificial aid. And when dealing with the cosmos, or with cosmic qualities, artificial aid, idealistic

[4] Capability of mathematically embodying a concept does not imply that it would be scientifically valuable, or even helpful, to do so.

philosophers notwithstanding, is impossible. The cosmic fate of history is the fate of time.

Newtonian time is, on paper or formally, a "cosmic time" because, by definition, every instant is spread throughout the whole extent of the cosmos. The Newtonian cosmos moves in linear progression from one instant to the next as a unit or simultaneously. On paper or formally, Einsteinian time, in contrast, is not a "cosmic time." The Einsteinian cosmos does not move forward from moment to moment as a unit or simultaneously. Instead of one cosmos-embracing instant or linear series of instants there are, in the Einsteinian cosmos, an indefinite number of indefinitely diversified "local times"; and therefore an event happening in one sector of the cosmos may or may not, depending upon experimental determination, be simultaneous with an event happening in another sector.

On paper or formally, Newtonian time is cosmic and Einsteinian is local. But just the opposite is the case when we pass beyond paper or formal considerations and comparatively evaluate the consequences and implications, in the fields of thought, of the two conceptions.

Just because Newtonian time is instantaneously uniform throughout the cosmos, time makes no difference. Any and every occurrence or happening has, by definition, its temporal setting. But since its temporal setting has a fixed and unalterable position in the self-sufficient and independent linear series constituting absolute time; and, moreover, since the temporal setting of any occurrence is also the identical temporal setting (at the "given time") for the cosmos taken as a whole, or for all its infinite parts taken distributively, the temporal setting of any occurrence or any series of occurrences is non-differentiating.

When, in the Newtonian system, occurrences are differentiated temporally from one another, the differentiations are either nothing more important than differences of "date" (chronology); or they are only the slightly more important differences of "amount of time" measurable in the time-spans involved. Absolute time, like a perfect klepsydra, permits the passage of only identically-sized temporal drops. Therefore time-spans can differ from one another only with regard to the numbers of drops (instants) they respectively contain; the differences, that is, are purely quantitative or arithmetical. In the case of both these types, and they are the only ones allowable in the system, the differentiations have no cosmic significance whatsoever.

Under the Newtonian regime, temporal concerns are, consequently, evidence either of "local interest" or "local necessity." In such matters as personal and social life, our temporal investiga-

tions are determined by "local interest." It is our merely human affection, or our merely human curiosity, which turns us historical. In such scientific matters as physics, astronomy, chemistry, and so on, it is "local necessity" that determines and conditions our temporal concern. As creatures of a day, we are, even in our loftiest scientific pursuits, unhappily compelled, oftentimes, to consider the temporal factor. However, although a necessary evil of human finitude, the evil is not altogether unconquerable. For in Newtonian science even when the temporal factor has to be considered, it is not seriously taken into account.

The establishment of the spurious independence of each other of space and time was not unbiassed—in its consequences if not in its motivation: it contributed to the greater glory of space. All changes and transformations became, really, nothing more than spatial rearrangements of masses. Spatial rearrangements, of course, require for their consummation various temporal spans. But the consumption of time is only an incidental or accidental feature. The essential scientific explanatory factors are the masses (or material substance) and the variations in their spatial positions. Hence the laws of nature which define the regulations under which changes are effected can always be (or at least should always be) cast in the eternal and immutable mold set by the law of gravitation, the topmost jewel in the Newtonian crown, the unearthly-gleaming lodestar of all science. In the law of gravitation, the factor of time does not enter at all, not even incidentally. With eternal and immutable control, with pure and prescient geometrical devotion, all bodies attract each other directly proportional to the product of their masses, and inversely proportional to the square of the distances between them.

Strictly speaking, Newtonian absolute time gives equal cosmological status to past, present, and future. But also an essential characteristic of Newtonian time is its constant, equable, uni-directional flow. As time flows into the future out of the present it seems that it can not help but continuously leave behind an ever-increasing past. These two somewhat contradictory features of Newtonian time both find a place in the short citation above from Russell. He asserts, first, that "past and future must be acknowledged to be as real as the present." Now if this is really taken to be the case, and time is an absolute wherein past, present, and future are all of equal reality, it is meet and proper to wonder why time is not as effective and as eternal a preservative of all things as anything else could be. Russell, it is clear, did not believe it is. Undoubtedly he believed that if time *were* left to its own devices, if it *were* given hegemony over all things, it would not eternally or everlastingly preserve, but

would tyrannically devour all that is. Consequently, to save all that is from such progressive annihilation, Russell at that time invoked the image of "an eternal world outside" whence all things issue into the stream of time. Presumably, if all things *come from* an eternal world outside, they can also, when it suits them, *return to* that world. That is to say, Russell believed, at the time of writing, that although their trips down the stream of time may temporarily indispose all things, the trips are really just outings, of indifferent cosmological and philosophical importance, and therefore do not affect their true and inner being, their essential natures.

Whether justifiably or not, it is an historical fact that Newtonian time did not undermine, but rather supported and strengthened, the widespread conviction that the past is gone, the present is vanishing, and the future does not yet exist. The ever-equably-flowing, the ever-perishing, the all-devouring aspect of time completely overshadowed its alleged perduring and eternal characteristics as an absolute. The modern philosophic problem of the "specious present" is an expression or consequence of this fact. So are also, to important extent, all the transcendentalisms, realistic and idealistic, which clutter the pages of modern thought. The premise that all things in so far as they are temporal are continually disappearing into the vast inane, is one of the necessary conditions for undertaking transcendental flights into imaginary empyreans to secure that at least the "essences" of all things shall be saved for eternal posterity.

Hence—as Russell indicated—it is when we go beyond Newtonian science proper and allow a true and noble Newtonian philosophy to be our guide, that we are really taken completely out of the land of temporal servitude. Under such leadership we are led through "the gate of wisdom" and then, when we lift our eyes on yonder side, we see in Russell's eloquent language, "things entering into the stream of time from an eternal world outside." Should we be wanting in philosophy, or should philosophy alone prove unequal to the task of carrying us across the divine threshold, happily for us all, there is always mathematics. It is an inalienable virtue of mathematics—a virtue demanding, as Russell used to sing, our highest and humblest tribute—that it is always ready and capable of giving us knowledge about a world we are in no wise acquainted with.

Just because Einsteinian time is "local" the temporal setting of an occurrence or happening is not an extraneous factor which can be ignored or cancelled out. The temporal setting is never a *mere* "date." It is a constitutive ingredient in the nature of the occurrence or event as that nature is determined within the framework

of experimental investigation. Under the Einsteinian regime, time makes a difference. And whatever makes a difference has a fundamental status in reality, has a cosmic import that defies all minimizing attacks. The non-cosmic or non-existent may properly be defined as that which does not occasion, within the supposed boundaries of its alleged presence, any differentiating effects or consequences.

To summarize the contrast: Newtonian time is formally cosmic, but it is actually of indifferent and purely local significance because it is wholly denuded of temporal quality, of consequential and differentiating power; whereas Einsteinian times, though formally local, are actually of cosmic significance because they retain undiminished and undiluted their temporal quality, because they are ineradicable constitutive characteristics—qualitative and differentiating—of the natures of the events comprising the localities experimentally determined.

IV

It would be hazardous to assert that Newtonianism is responsible for originating the invidious distinction between "structure" and "function" which has plagued modern historical inquiry, and in which distinction the problems of historical interpretation may be said to sum up. It would be flatly false to assert that Newtonianism is responsible for originating the contributory idea that environment and inhabitants (or habitat and inhabitants) are basally independent of each other, that they are related externally. As far as the latter idea is concerned, it is part of an ancient tradition that God set down a finished Adam in an antecedently completed habitat; and the relation of independence and externality exemplified in the case of Adam and the Garden of Eden was, by the same ancient authority, conceived to be the relation existing between all habitats and all inhabitants, severally and generally.

However, it is small excuse that Newtonianism perpetuated as "science" a doctrine and point of view that are properly only mythological. And it may safely and justly be said against Newtonianism that whether or not it was, in particular cases, the source or originator, it was always either the silently benevolent supporter, or the industrious partner of modern thought whenever and wherever the latter undertook to make invidious distinctions and malicious disjunctions, whenever it undertook to partition and divide —preferably in two parts—what is in common experience united, especially when the partition and division was followed up by giving each part an independence that set it over against the other part either in undisguised opposition and contradiction or in implaus-

ibly hidden indifference and neutrality. Newtonianism, it can not be too strongly asserted or too often repeated, "scientifically" underwrote, *ex post facto* and in advance, all and any "bifurcations" wheresoever and howsoever they may be made to occur. Until our own day, the cosmology of Newton was the supposedly unassailable "scientific" basis of the "bifurcation of nature."

Inhabitants always live in a habitat. Investigations started by Darwin and carried much further by his successors, have effectively destroyed, in the domains of biology, the utterly preposterous idea that habitat and inhabitant are in their natures independent of each other. Instead of being independent and externally related, it has been demonstrated conclusively that habitat and inhabitant are always, though in widely varying degrees, symbiotically related; that together they constitute one comprehensive social life that is constantly undergoing processes of integral adaptation. The strictly Darwinian theory gave over-emphasis to one specific direction of adaptation, namely, the progressive; and the term "evolutionary" or "evolution" became unfortunately identified with this uni-directional interpretation. It is clear now, however, that adaptation is no less such, and no less "integral" when the processes are socially catabolic. For "integral adaptation" properly includes both disintegrative and integrative, regressive and progressive, catabolic and anabolic social processes. The only requirement processes have to fulfill to establish the fact of integral adaptation (or symbiotic relation and activity) is that the carrying through of these processes be an interactivity of habitat and inhabitant and that the consequences, near and remote, be interactive and interpenetrative throughout the whole domain, affecting all participants according to their respective rôles, whether they be so-called active or so-called passive, and according to their respective differentiating qualitative constitutions and patterns.

For it can not be denied—nor is there any need for denying—that there are specific differences in the interactive capacities or sensitivities of different habitats and different inhabitants. There are, for example, the obvious specific qualitative differences between biologic forms and stones. The former are more sensitive, have greater interactive powers and capacities, than the latter. It is also obvious knowledge that countless chemical solutions are immeasurably more sensitive, more responsive and flexible in interactions than biologic forms. There are events which are governed by large-scale patterns and which are, ordinarily, imperceptibly interactive, their powers for modifying and their capacities for being modified evidencing themselves only in enormous cosmic periods. There are events governed by minute-scale patterns and which are

also, ordinarily, imperceptibly interactive—but for the opposite reason: they modify and are modified with incredible rapidity. These and innumerable other specific differences are important concerns for investigations in specialized domains, but they leave unaffected the general principle that can, since the destruction of the Newtonian cosmos, be asserted without qualification and without fear of contradiction from the "higher" natural sciences: The basic form of cosmic behavior, manifest in all its diversified domains, great and small, is interactive.

The fundamental Newtonian notions of action and reaction are correlative distinctions made, *ex post facto* and for a specific intellectual purpose, within the inclusive mode of cosmic interactivity. They do not define the native mode of cosmic behavior even within the restricted domains of physics and astronomy. Action and reaction are terminological artefacts of an intellectualized discrimination. Newton's setting them over against each other in equal and balanced power is a specific celebration of the "bifurcation of nature" his cosmology enthroned. As long as time and space were conceived Newtonianwise, interaction or integral adaptation, although a mode of behavior undeniable in *some* domains, could not obtain the official support of the sciences allegedly devoted to disclosing the ultimate constitutional methods of the universe. The concept of interaction or integral adaptation consequently remained lamentably restricted in scientific scope, and the poor plaything of mere philosophers, until the sovereign title of Newtonianism to legislate for the universe was rendered null and thrown out into the void by the scientific court. That interaction or integral adaptation is the omnipresent, native mode of cosmic behavior is now established by the concurrent testimony of all sciences, from the supreme to the lowliest.

I have used in the foregoing the phrase "interaction or integral adaptation," but I think the latter half of the phrase is superior to the former because it is more capable of conveying, or is, at least, more likely to convey, recognition of the fact that all activity, from the most elementary and elemental to the most highly complex, is determined and conditioned by the constitutive and interrelational *patterns* of the habitats and inhabitants involved; and that the consequences of all activity are changes or transformations or readjustments or reconstructions or reformations of those same constitutive and interrelational *patterns*. The term "interaction," because of its historical affinities and associations, is too apt to perpetuate (if only by insinuation) the foundationless idea that there are, in nature, unit-entities, purely homogeneous in substance, without internal constitution or pattern, and that these unit-entities

can and do charge against each other, can and do attract each other, can and do bump into and bounce off each other, with no other consequences ensuing than displacements in space and transferences of motion or power. I may be mistaken in believing that the phrase "integral adaptation" is superior to the term "interaction" for the reasons and in the general respects indicated. But it is very unimportant if I am. The fact and the idea are alone important. The fact is that organization or pattern is omnipresent or ubiquitous in the cosmos; the idea is that this fact, because of its basic cosmic character and position, must control all our thinking, in science and out. Any results of our thinking which can live only by ignoring, denying, contravening, or contradicting this fact deserve the respect and attention properly restricted to conclusions that are devoid both of experiential and experimental foundation.

V

It would be a needless excitement of the mind to attempt any stringent connection between the more familiar and concrete disjunction of habitat and inhabitant, and the more abstract and theoretical disjunction of structure and function. It is sufficient to point out, generally, that the acceptance or creation of one disjunction leads to the creation or acceptance of another, and so on indefinitely. Disjunctions, curious though it may sound, breed as prolifically and perhaps even more effortlessly than conjunctions. The disjunctive habit of mind or the disjunctive method in thought has been the bane and torment of the modern intellectual and cultural world. If history is any guide, it is the habit or method easiest to establish and the most difficult to overcome.

Newtonian science, due to its denigration of time, was all on the side of what we may call the geometrical (Euclidean) relations, what we have referred to above as the spatial arrangements of masses. The highest and most satisfactory type of scientific explanation was exclusively or purely geometrical—as in the law of gravitation. When this supreme form of explanation could not be attained, the explanation had to be at least predominantly geometrical to win any sort of recognized place among the official arcana of science. On the other hand, explanations which were predominantly temporal were not scientific at all. It would not be far from the mark to say that until the advent of Einstein, the "scientific quality" of an explanation was directly proportional to the extent to which geometrical relations were dominant factors in that explanation, and inversely proportional to the extent to which temporal relations were dominant.

It would be foolish exclusively to identify structure with geometrical relations, but it is legitimate to consider geometrical relations as defining or exhibiting the type-form of what Newtonian science understood structure to be. Similarly, we may justly consider temporal relations as defining or exhibiting the type-form of what Newtonian science understood function to be. Now the sharp and absolute separation of space from time, and the relegation of the latter to inferior, even superficial status, would, it is easy to see, reflect itself in, if it did not originally cause, the line of cleavage between structure and function. Structure and function were also sharply separated from one another and then were reunited by an external relation—which form of union is only a more exasperating way of intensifying the disjunction.

Consistent with Newtonian method, ultimate cosmic significance and reality were attributed to structure: and to function was given an inferior, negligible status in science and in nature. Knowledge of a thing, what a thing *really* is, was knowledge of its structure, of the geometrical, non-temporal relations formed by the constituent particles or masses. Knowledge of the structure, in short, was identified as knowledge of the *nature* of the thing. In contrast, knowledge of the function of a thing, of its modes of behavior, was deemed a very lowly, secondary, or derivative sort of knowledge—if, indeed, knowledge it could be truly called. Since function, no matter how interpreted, must contain the factor of time, not as an incidental, but as an essential ingredient, knowledge of the function was, Newtonianwise, knowledge *merely* of the temporal career, or of the *mere* operations, the *mere* products, the *mere* consequences of the *real nature* (non-temporal structure) of the thing.

Darwinism brought the concept of function up from the nether scientific regions into the light of living day. The controversy that was immediately engendered over the relationship between structure and function (or nature and history) eminently illustrates the futility of trying to make a set of developmental or evolutionary ideas fit into the fixed and constricted confines of a set of static ideas. Such attempts lead only to desperation. Into the details of the controversy we can not go; besides it is needless to do so now. Suffice to say, the controversy was largely carried on under such rubrics as "structure *versus* function" (or *vice versa*) or "history *versus* nature" (or *vice versa*)—a type of formulation and a method of approach unhappily symptomatic of the Newtonianesque mindset of the period.

If we start by setting structure and function (or history and nature) in opposition to each other, the only logical conclusion we can reach, no matter what line of argument we pursue, is that struc-

ture and function (or history and nature) are opposed. To be sure, our dialectical tergiversations may so turn our own heads that we do not reach this logical conclusion but some other. Dialectical vertigo is, in fact, the most contagious and most malignant of the various occupational diseases thinkers contract. When thinkers strenuously labor to bring forth a mountain, they practically always render themselves incapable of seeing when it is just a mouse. They are all-inclined to believe that their extraordinary pains have born the fruit of real union when, as a matter of fact, they have done nothing more than reproduce, in confounded disguises, the division they started with. The capacity for self-deception is limitless—and philosophers and scientists are not exceptions to the rule. Happily, the power to deceive others has its bounds.

VI

The Newtonian assertion that past, present, and future are equally real parts of absolute time results only in delusion because Newtonianism has then to turn around and differentiate the past, present, and future *as parts of measured time*—the only way time actually enters into scientific accounts. In the Newtonian system, past, present, and future, as parts of measured time, are *consecutive* segments of an unidirectional, independent linear series of instants; and no instant can appear in scientific experimental research except its immediate cosmic predecessor has already lapsed, and its immediate cosmic successor has not yet come on. There may be some "higher" comfort in talking about consecutive segments of a moving line, or consecutive instants of a uni-directional series of instants being all co-existential equals in some "absolute dimension"; but there is *no scientific sense* in thus talking about them when in science as carried on under this regime, they are not actually dealt with in this "higher" way. Furthermore, and perhaps most importantly, it is clear that although the Newtonian past, present, and future are continuous parts of a continuous series when formally considered, they are, in Newtonian scientific procedure, cut off from one another and mutually exclusive. The Newtonian present, true enough, is always shifting; but in its continuous movement in one direction it always hermetically blocks off the ever-receding past from the ever-imminent future. No matter how narrowly the present is trimmed down, it always remains, for the past and future, an unnegotiable abyss, affording no point, half-way or otherwise, where they can meet. In the Newtonian system, all measured times, moments, instants are insulated from all others; they troop after each other in rigid formation and fixed order, but there is no interchange, no interaction between them—no intercourse, so to speak, between mem-

bers in the ranks. Hence in the Newtonian cosmos, history is an unimportant career, and function and integral adaptation are philosophic curiosities.

In common experience, past and future have always been parts of an inclusive present. To start with the simple example of social life, it is obvious that the past—in the form of customs, habits, institutions, memorials, beliefs, crafts, arts—is part of the living present. It is likewise obvious that the future—in the form of directions and tendencies of change, of reconstruction, of re-formation—is also part of the living present. Finally, it is no less clear that the past and future are not inactive, merely compresent parts of a living contemporaneity: they are the contemporaneously interacting factors, the contemporaneous forces undergoing processes of integral adaptation.

When we consider the individual human being as a member of social life, the same is, of course, revealed since the individual is the natural carrier and perpetuator of social forms and the natural ground of social processes of change.

Passing from common experience in social life to commonly known scientific findings in the non-human world, in the biologic domains all evidence inescapably points to the conclusion that past and future are adaptive processes in an integrating present. Aristotle made scientists and philosophers conscious of the fact that acorns grow into oaks. But for Aristotle, unfortunately, the mature form was in some way rolled up and encysted as a finished thing in the seed. Consequently, the growth of the seed, the realization of the-mature-form-to-be-attained, was a process of unrolling a future completely settled in the past. In the Aristotelian-Newtonian system growth was anything but an integral adaptive process; indeed, only by a figure of speech could it be called a process or growth at all.

Evolution did not disestablish the fact that acorns grow into oaks. But it did make ridiculous any doctrine or theory which starts with acorns as aboriginal full-fledged oaklings and which requires that God or nature plant them in the void. Whatever be the final terms of evolutionary explanation, we know now that within primordial amoeba future multicellular organisms are not Aristotelianwise contained. And we also know now that in the comprehensive social[6] processes of history the latter do progressively evolve out of the former. For our present purposes this knowledge is sufficient. Any cross-section of evolutionary history—which we may call the evolutionary present—is, consequently, a cross-section of past-and-future.

[6] By "comprehensive social processes of history" we mean integral adaptations of habitats and inhabitants.

The evolutionary present—and it is the only kind of present that exists—is the area of interaction, of integral adaptation, the area of conflict and adjustment between past and future.[7]

To define the present as the area of conflict and adjustment between past and future may sound mystical. In so far as it does, it is unfortunate. We intend no mysticism. It is perhaps relevant and proper to point out that sounds ring mystically only in comparison with sounds our ears have become accustomed to. The utter simplicity of Newtonian time was its most attractive feature and greatest recommendation; because of its simplicity it rapidly seeped into all branches of modern thought. But Newtonianism, alas, made time simple—at the enormous expense of making practically everything else intolerably mysterious. Under the impress of Newtonian thought, first psychology and philosophy and then biology and history floundered in a mysterious morass of inanity. This was taken to be the natural condition of these fields, the direct evidence of their impregnability to scientific or rational treatment until the sacred precincts of Newtonian physics and astronomy began to show overt signs of similar afflictions. It is unfortunate if we must speak of time in strange and unaccustomed accents. But it is infinitely preferable to do this than to continue in the Newtonian tradition and speak of time with preternatural lucidity and of everything else with compounded confusion.

VII

The evolutionary present is a qualitative area (indefinitely contractible or extensible) of adaptive processes qualitatively integrated. Within this area of conflict and adjustment, the past and future may be identified as structure and function, respectively. In its native qualitative state, the evolutionary present is characterized by forms of periodicity, by fluctuations, by risings and fallings, by progressive, forward-surging movements and regressive contractions, by relative estoppals and relative initiations. The constant interflow and interfusion of the diverse movements which constitute the evolutionary present do not, of course, go on between nicely trimmed and definitely marked boundary lines; nor does any one course of movement preserve an unambiguous and unchanging identity which can be traced clearly and directly, or by simple inspection, through all the interweaving processes of adaptation in which it participates.

Now any scientific or intellectual activity can not properly proceed except within boundaries that are definitely drawn (if not also nicely trimmed) and except with terms that are at least preponder-

[7] The reader should keep in mind that we use the term "evolutionary" to include both regressive and progressive integral adaptations.

ately *un*ambiguous. Hence the primary concern of thinkers to enclose the area of their investigation within limits that will serve as "frames *for* reference" (otherwise known as systems of coördinates) and their concern to establish a set of discriminated terms which will mark off from each other the various factors, forces, phases, elements, that are operative within that enclosure. The discrimination of structure from function is of this sort: it is an intellectual demarcation, which is the same thing as saying that it is purposive, that is, it is made for the help and advantage it affords the specific inquiry, or the specific kind of inquiry, underfoot.

It follows that a philosophy which converts the purposive discrimination of structure and function into a once-and-for-all existential subordination of structure to function, is only less irrational than a philosophy which does contrariwise. It is less irrational because the intention of giving precedence to function is to ensure temporal process as fundamental; but it is still irrational because by giving absolute precedence to function it undermines the qualitative integrity of the domain within which structure and function adaptively operate. The establishment of any fixed and absolute precedence is in effect and in so far forth a delimitation and denial of the interflow and interfusion of the cosmic processes of adaptation going on. We may sympathize with the enthusiasm which leads to the aggrandizement of the concept of function—but both our sympathy and enthusiasm are misguided none the less. To aggrandize the concept of function at the cost of limiting the range and destroying the integral quality of adaptive processes is, recognizably, a contradictory, a self-nullifying undertaking.

As long as structure was conceived as the self-sufficing, self-enclosed "inner nature" of a thing, it was inevitable that function should be conceived as merely the overt career, the behavioral expression or extroversion of that "inner nature." In any given instance, such expression or extroversion was of course always defective because of the inconsiderate interruptions and distortions enforced by the overt careers of other things. Only in a private vacuum would the "inner nature" of any given thing have adequate and proper room for its full and unmarred expression. But nature behavioristically abhors a vacuum. Therefore those many philosophers and scientists who are moved by idealistic persuasions, responded to nature's aversion by defining structure as constitutive of the "eternal entity" (essential or "inner nature") and function as the ephemeral, inconsequential process. And to seal the bond of their compensatory love, they consecrated themselves to the twofold task of first explaining all natural things in terms of essential natures (really "inner vacua") and then of providentially fabricat-

ing transcendental vacuous domains wherein the essential natures (or inner vacua) shall be able eternally to disport themselves, according to their kinds, with unfettered glory.

Structure can be no more self-sufficing, no more self-enclosed, no more entitative than function. If the one is a non-temporal entity, so must be the other; if the other is a temporal process, so must be the one. As to which they both actually are—eternal entities or temporal processes—there can now be no doubt in any scientific mind. Obviously, they must both be the latter. For in a cosmos of events, the natures of all things are processes (groups or complexes of events), and structure and function are purposive discriminations within the inclusive natures of things. Hence they can be no other than terms marking off two pervasive kinds or types of cosmic process. The terms "structure" and "function" are deceptively nouns; the unmisleading terms are the adjectival or adverbial forms, structural and functional.

VIII

As scientific and intellectual inquiries differ from one another so perforce must correspondingly differ the definitions framed of the structural and functional. Definitions which do not take into account the specific differences of the subject-matters investigated, or the specific differences of the problems to be solved in the same subject-matter, are not helps to inquiry but hindrances and hence have no rational place either in science or thought. Any general definition of the structural and functional can only have the value or validity, then, that a leading idea or a general principle can have, namely, the value or validity of indicating where and how the line of demarcation may be drawn. It can have no stringent universal legislative or mandatory power.

The structural and functional are operational[8] demarcations within the inclusive nature of a thing (whatever the thing may be) as that nature is contextually limited by the coördinate system or the frames for reference set up. As operational, qualitative distinctions, the structural and functional define, respectively, that which, within the nature, is inherited (be it as a periodic, recurrent or otherwise enduring process) and that which, within the same nature, is an emergent process initiating a new course of movement which necessitates novel integral adaptations. The new course of change or movement initiated by the functional is no less novel, when, upon fulfillment, it turns out to be nothing more cosmically exciting than the enstatement of a mode or way of activity other

[8] *Operational* because varying with variations in subject-matters and problems.

natures have already attained. For it is only within the specific contextual definition of the nature of a thing that the novel (or functional) as well as the recurrent (or structural) can be intelligently discriminated. Poets and parents are not disenchanted concerning the novelty of their songs and children because others have sung and given birth. In this respect—if in no other—poets and parents are philosophically sounder than those who will admit no novelty unless it be a sheerly and absolutely unprecedented occurrence in the cosmos. We do not deny the factual possibility of the latter sort of occurrence. All we need point out is that such cosmic novelty would not be an exception to, but would fall within the precincts of the definition of, the novel just given. For in such case, the inclusive nature of the thing within which the novel would be discriminated would be no less a thing than the total cosmos.

The structural is representative and constitutive of the past; the functional is representative and constitutive of the future. The area within which the structural and functional are confluently interactive is the evolutionary present. Within this area (whatever be its demarcated extent) the qualitative integrity of the nature of the thing is continuously supported and continuously re-formed and reconstructed by processes of integral adaptation.

The structural and the functional, the past and the future, are existential in, and only in, the evolutionary present. Recognition of the essential contemporaneity of the existential past and the existential future overcomes the dilemma of evolutionism—as that was alleged to exist in the Darwinian epoch. The problem of origins is always a contemporaneous problem; and the solution of the problem is therefore always and only to be found in contemporaneous structural and functional processes. A process, structural or functional, which does not operate in the contemporary period, or the evolutionary present, would explain nothing—supposing such a process could be found. But that such could be found, we deny. For a non-contemporaneous past, or a non-contemporaneous future, is not even an accessible province to fiction, poetic or prose. It is the proper province of, and accessible to, nothing at all.

When time is detemporalized or denuded of temporal quality, history becomes ahistorical, mere chronology, and as such adventitious to the natures of things. But it is impossible to set "history" over against "nature" or to contrast them in any mode of inferiority and superiority, subordination and superordination, when the temporal quality of the cosmos is retained. When the basic fact of cosmic process is made the fundamental proposition of cosmology, history can not be adventitious to the natures of things (as mere chronology undoubtedly is) for the simple but conclusive reason

that "the history of a thing" and "the nature of a thing" are, in such a cosmology, as they are in the cosmos, equivalent expressions.

JOSEPH RATNER.

NEW YORK CITY.

BOOK REVIEWS

Revue de Métaphysique et de Morale, 44e Année, No. 1. Numéro spécial consacré à Descartes à l'occasion du 3e Centenaire du "Discours de la Méthode." Paris: Armand Colin. 1937. 352 pp.

By the time this notice appears subscribers to the *Revue de Métaphysique et de Morale* will already have seen and read this special number. It may be desirable, however, to indicate to others that they will find in it several articles which contain relative novelties and may therefore enlarge their knowledge of the philosopher whose thought is under discussion. Such articles are those of E. Bréhier on Cartesian matter and creation which points out how Descartes' theory of matter as extension relegated necessarily the question of creation to the domain of revelation; of S. V. Keeling on Descartes' realism and the *"natures simples"* which invites attention to a neglected element of Cartesianism; G. Loria on Descartes as geometer; and H. Dreyfus Le Foyer on Descartes' medical conceptions. It should also be pointed out that the studies in this volume also show the novelty as well as the traditionalism of Cartesianism. It has become fashionable to suggest that because of Descartes' undoubted debt to scholasticism, there was really little new in his theory. Such a suggestion was, if taken seriously, very unfortunate; the seventeenth century certainly saw in its greatest philosopher an innovator and Descartes himself seems to have had the impression that his teachings were novel. One can find doctrines as peculiar as that of the *bêtes-machines* in St. Thomas, but the intellectual importance of the doctrine was certainly not attributable to its revival of a feature of scholasticism. Similarly one can find almost all of Bergson in Schelling and Plotinus, but that is not why Bergson was read by thousands in the beginning of this century.

G. B.

Friedrich Schlegel: Neue philosophische Schriften. Erstmals in Druck gelegt, erläutert und mit einer Einleitung in Fr. Schlegels philosophischen Entwicklungsgang versehen von JOSEF KÖRNER. Frankfurt: Gerhard Schulte-Bulmke. 1935. Pp. 393. 15 M.

Friedrich Schlegel was regarded by Hegel and Schelling as a dilettante in philosophy, and their judgment has been accepted and repeated by most philosophers since his death. The editor of the

present volume challenges the justice of this verdict. Schlegel did not, it is true, ever construct a metaphysical system comparable to those of his great philosophical contemporaries. His hitherto published writings are primarily historical in orientation and are concerned chiefly with literature and religion. Dr. Körner argues convincingly, however, not only that Schlegel's central interest from first to last was philosophical in character, but that, as the studies here published indicate, his achievements in philosophy are still worth serious consideration.

The editor's long introduction to the present volume traces Schlegel's fascinating voyage of discovery—his early preoccupation with Plato and Kant, his defense and later his criticism of Fichte and Spinoza, his contacts with Jacobi and Herder, Schelling and Novalis, Schleiermacher and Hegel, his allegiance to both realism and idealism resulting in a life-long endeavor to achieve a higher synthesis, and his final acceptance of Catholicism. Schlegel emerges from this spiritual biography as a man who spent his life attempting to reconcile philosophy and history, reason and faith, fact and value. He never achieved this reconciliation in anything like a systematic or satisfactory manner, but his penetrating formulations of these problems and his numerous constructive suggestions constitute significant contributions to philosophical analysis.

The writings of Schlegel here published for the first time are his *Transcendentalphilosophie,* in the form of a full outline of his projected systematic metaphysic, a sketch in French of a lecture on philosophy for Mme. de Staël, and notes, in readable outline form, on beauty in poetry. Two long reviews on Jacobi, in which Schlegel's own ideas are developed, are also included. These works are discussed by Dr. Körner in some detail, together with many notes and references.

The volume is of unquestioned value to students of the romantic movement in Germany and to philosophers interested in the problems with which Schlegel so resolutely struggled. The editor announces his willingness to publish more of Schlegel's unpublished writings if opportunity offers. He should certainly be encouraged to do so.

T. M. G.

Das Wirklichkeitsproblem der Erkenntnistheorie und das Verhältnis des Psychischen zum Physischen. CURT WEINSCHENK. Leipzig: O. R. Reisland. 1936. Pp. xxiv + 184. 9.25 M.

This book upholds epistemological (critical) realism and carries on a running polemic against its two enemies, epistemological idealism and naïve realism. The former position, epistemological ideal-

ism, is criticized for its groundless assumption that only the contents of consciousness, ideas or sensations, are given and can be known. This principle, which Dr. Weinschenk calls "the doctrine of consciousness," and which he takes to be a basic tenet of a great variety of philosophers: Descartes, Locke, Berkeley, Hume, Kant, Herbart, Fichte, Schopenhauer, E. von Hartmann, Wundt, Schuppe, Schubert-Soldern, A. Riehl, Volkelt, Cohen, and J. Bergmann, to name a few, is, to his mind, not only groundless, but often contradictory and incredible in its consequences. As an example of how convinced philosophers can be of a mistaken principle, the author cites the case of Rickert who held that the doctrine of consciousness "possesses much stricter generality than any scientific theory." Among the philosophers who accept the doctrine of consciousness, some start out with it as a self-evident principle while others argue to it from the facts of experience. The former, the author holds, make an unwarranted assumption while the latter invariably commit the "physiological" fallacy. They argue that since physiological processes determine our sense-data, sense-data can not be identified with surfaces of the physical objects which stimulate our sense organs, and that, consequently, all we can know are sense-data. The argument, however, assumes that something besides sense-data can be known, namely, physiological processes.

Dr. Weinschenk's arguments against naïve realism are of the usual sort, but his attack on the "naïve realism" of both the phenomenologists and the Vienna Circle is somewhat more novel and arresting. Both schools are accused of rejecting the traditional problems of epistemology without a trial to establish their spuriousness. Both are charged with a reversion to naïve realism and a flouting of the well-known difficulties of that position. But surely this stricture does not apply against Husserl. Had Dr. Weinschenk kept in mind Husserl's extensive treatment of epistemological questions and the *phenomenological* character of his naïve realism, instead of relying on one sentence from the "*Nachwort,*" he would not have allowed this criticism to stand. Nor can Husserl be rightly accused of inferring that because a content is immediately given, it is immediately knowable. The author's complaint, on the other hand, that it would be as easy to stop breathing as to carry out the complete phenomenological reduction, may well be justified. Dr. Weinschenk's own realism takes all knowledge to be mediate. Contents of the mind can be immediately given but not immediately known while physical objects are neither immediately given nor immediately known.

The discussion of the psycho-physical problem is the least satisfactory in the book. To establish the substantial difference between the mental and the physical is impossible, since the comparison would

require a knowledge of both. Unfortunately, only physical things can be known (*anschaulich erkannt*), not ideas. But the author not only contends that we can not know whether the mental and the physical are heterogeneous or not. He also contends that we *can* know they are not. To reach this conclusion we have only to accept panpsychism and commence to believe along with Scheler's children and savages that everything under the sun has a soul.

V. J. McG.

The Social Contract: a Critical Study of its Development. J. W. GOUGH. Oxford: The Clarendon Press. New York: Oxford University Press. 1936. vii + 234 pp. $5.00.

This book does two things: it gives a history of the idea of a social contract from Herodotus and Plato to our own day, and it seeks to state explicitly and precisely what there is of truth and what there is of error in the idea. Both things are accomplished with distinct success.

Space would not permit a detailed review of the historical account which occupies the bulk of the pages of the book. One point, important if not new, comes out with a clarity which alone would justify the writing of the book. This point is the diversity of purposes to which the idea of a social contract may be put. The contract idea has usually been a device for the defence of individualism against a totalitarian state, for the claim of popular rights against every form of absolutism, even for the proclamation of a right of revolution. But at times it has been used to define the proper limits of governmental authority without any desire to justify popular rights against rulers (as in certain fourteenth- and fifteenth-century writings, cf. chapter IV), to bolster up the independence of certain societies rather than promote the liberty of individuals (as in the case of the New England Puritans, cf. p. 86), or even to assert the authority of established political forms against rebellious persons (as in Hobbes, cf. chapter VIII). Personally I should have to differ with Mr. Gough's account of Hobbes as identifying might and right (p. 100), as holding that "according to Hobbes, there is no right or wrong, and there can be no obligation" (p. 102), and as making force and fraud "the cardinal virtues" (p. 127). But throughout the historical analysis Mr. Gough has been thorough, competent, and instructive, whatever differences of opinion may arise on special points.

As Mr. Gough says, it would be surprising if a theory which has been widespread for two thousand and more years had no kernel of truth. Since the days of Hume, even more since the days of Hegel, no competent political philosopher has supposed that the idea of

social contract described a typical historical event; but many writers have continued to speak of a "tacit contract," an "implied contract," or a "quasi-contract." These terms, Mr. Gough maintains, and, I think, rightly, are metaphors which lack clarity and require analysis. It will not do to treat the idea of contract as a Kantian regulative idea; that is, it will not do to say that political relations should be ordered "as if" they rested on a contract. Such a device will not do, because it is a means of promoting vagueness of thought. Political rights and duties, like moral rights and duties of which political rights and duties are one kind, may in special cases be contractual. Normally neither the political nor the moral rights and duties rest on any contract explicit or implied. Moreover such rights and duties do not depend, as T. H. Green supposed, on their recognition by the particular societies or individuals concerned. Mr. Gough refers favorably to and in general accepts the theory of duties and rights as that was defended by Mr. E. F. Carritt in his recent book on *Morals and Politics*. In harmony with this position he here concludes that "the state indeed involves a reciprocity of rights and duties," and that "the duty of obedience to the laws can be explained, without any recourse to the social contract, in terms of the responsibilities and duties to our fellow men which are the necessary correlatives of their rights" (p. 230). This means that Mr. Gough regards politics and ethics as virtually one field of problems, and that he would solve political problems, not in legal or historical fashion, but in terms of moral theory.

S. P. L.

Philosophie et Sciences. Journées d'Études de la Société Thomiste. III. Louvain, 24 et 25 Septembre, 1935. Le Saulchoir, Belgium: Société Thomiste. 1936. 213 pp. 15 fr.

At the first of the four sessions of the joint meetings of the *Société Thomiste* and the *Société philosophique internationale de Louvain* devoted to the discussion of the relation of science and philosophy, Professor Mansion traced the failure of the Aristotelian physics to a neglect of the distinction between philosophy and science. Although Professor Mansion is unable to find this distinction in Aristotle, he finds traces of it which lead him to condemn Aristotle for an exclusively philosophic interest and a total neglect of science; mathematical physics and experimental biology were non-existent for him. Father Salman, reporting on the Scholastic conception of physics, finds there a similar neglect of this distinction between philosophy and science which is "universal today" (the name of Bergson has apparently been forgotten, but there are contemporary philosophic movements directed to the "unity of science" among

Thomists as well as among philosophers of other camps) which he attributes to a naïve identification of the "physical" with the "sensible." In both reports the circumstance that the Aristotelian physics did not anticipate the methods and distinctions of modern physics is made excuse for neglecting the method it did use and for examining it by criteria suggested by the methods of later scientists. At the second session M. Renoirte reported on the reciprocal contributions of philosophy and physics to each other (philosophy examines the presuppositions of physics; physics saves philosophy from the vagueness and errors of the common sense conception of the material world), and M. Simon explored some of the epistemological difficulties involved in the conception of the reality of physical objects and the notion of a "philosophic experience." At the third session M. Gonseth and Father Guérard des Lauriers examined, in view of the same broad concern with the relation of philosophy and science, the concept of necessity in mathematics, and at the fourth session M. Michotte and M. Fauville reported on the relation of psychology to philosophy. One has the impression in reading these reports and the discussions which followed that the problems of the philosophy of science center about the distinction of a group of philosophic disciplines from a group of scientific disciplines, the distinction being fortified on the one hand by an extreme insistence on the use of a mathematical method for anything which purports to be scientific and on the other by an equally extreme, though more variable, insistence that psychological data and physical data (or, as some of the speakers refer to them, the data of experience) have no direct relationship to each other. It would perhaps be historically premature to see in these distinctions a second stage in the history of Scholasticism: in the first the Aristotelian science was reconciled with the Augustinian theology; in the second the Aristotelian science is abandoned (although it is recognized to be indistinguishable in Aristotle from Aristotelian philosophy), and the New Scholasticism is made up of three components, Augustinian theology, modern science, and Aristotelian philosophy, the latter in turn made up (it would seem) of metaphysical doctrines, concerning which the controversies go back to the Dominicans and Jesuits of the sixteenth and seventeenth centuries, and epistemological doctrines, concerning which the controversies go back to Kant.

R. McK.

Force or Reason. Issues of the Twentieth Century. HANS KOHN. Cambridge, Mass.: Harvard University Press. 1937. 167 pp. $1.50.

These Harvard Lectures are concerned primarily with an analysis of the present social and political scene, but they contain incidentally many interesting remarks on the motivations of current philosophy. In the first lecture, "The Cult of Force," Professor Kohn examines the relation of this cult to the idea of the will to power, and the relations of overpowering fear to the philosophies of Kierkegaard, Heidegger, and Karl Barth. In the second lecture, "The Dethronement of Reason," he describes the recent revival of romanticism and anti-intellectualism. It is perhaps inevitable that these lectures should exaggerate somewhat, but there seems to me to be an unnecessary "dethronement of reason" in the author's apparent assumption that all emphases on the categories of life and action are *ipso facto* attacks on reason, and that all expressions of actual conflict are irrational attacks on civilization. After all, philosophy, though it is not a mere use of reason, is not necessarily a cult of reason. Is it necessarily irrational to be sceptical of the power of reason? Is this not in large part a question of fact, not of value?

H. W. S.

OTHER NEW BOOKS AND JOURNALS

Le Roy, Georges: L'expérience de l'effort et de la grâce chez Maine de Biran. Paris: Boivin & Cie. 1937. 437 pp. 50 fr.

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NOTES AND NEWS

Professor Charles Hartshorne calls our attention to "an article by Professor Elmo A. Robinson, of San José State College, giving the results of a questionaire addressed to one hundred former philosophy majors of Stanford and California, asking what valuation they make of their philosophical studies. (One result is that only three regret having majored in philosophy.) The article, which seems excellent in quality, is 'The Aftermath of Philosophy' in *The Educational Forum,* Volume I, Number 4, pp. 495–503."